

CLAIMS

1. A stacked piezoelectric device comprising piezoelectric layers composed of a piezoelectric material and internal electrode layers containing Cu, each of the piezoelectric layers being stacked alternately with each of the internal electrode layers, wherein the internal electrode layer contains not less than 50 percent by weight of Cu element, and a pore occurrence expressed by  $(B/A) \times 100$  (%) is not more than 5 percent wherein A is an area of an interface between the internal electrode layer and the piezoelectric layer and B is a sum of areas of pores which appear in the interface and have a diameter of not less than 0.1 micrometers.

2. A stacked piezoelectric device according to claim 1, wherein the internal electrode layer contains not less than 95.0 percent by weight of Cu element.

3. A stacked piezoelectric device according to claim 1, wherein the internal electrode layer contains not less than 99.0 percent by weight of Cu element.

4. A stacked piezoelectric device according to claim 1, wherein the internal electrode layer is composed of a pure copper metal containing not less than 99.0 percent by weight of Cu element.

5. A stacked piezoelectric device according to claim 1, wherein the internal electrode layer is composed of a copper alloy containing not less than 95.0 percent by weight of Cu element.

6. A stacked piezoelectric device according to claim 1, wherein the pore occurrence is not more than 3 percent.

7. A stacked piezoelectric device according to claim 1, wherein a surface roughness (arithmetic mean roughness)  $R_a$  of the interface of the piezoelectric layer contacting the internal electrode layer is not more than  $0.5C$  ( $\mu\text{m}$ ) wherein C is a thickness of the internal electrode layer in micrometer.

8. A stacked piezoelectric device according to

claim 1, wherein a surface roughness (arithmetic mean roughness)  $R_a$  of the interface of the piezoelectric layer contacting the internal electrode layer is not more than  $0.2C$  ( $\mu\text{m}$ ) wherein  $C$  is a thickness of the internal electrode layer.

5 9. A stacked piezoelectric device according to claim 1, wherein a pore abundance expressed by  $(D/C) \times 100$  (%) is not more than 5 percent wherein  $C$  is a thickness of the internal electrode layer in micrometers and  $D$  is a  
10 size of a pore in the thickness direction of the internal electrode layer in micrometers.

10. A stacked piezoelectric device according to claim 1, wherein the piezoelectric material constituting the piezoelectric layer comprises PZT which is a  
15  $\text{Pb}(\text{Zr}, \text{Ti})\text{O}_3$ -based oxide having a perovskite structure.

11. A stacked piezoelectric device according to claim 1, which is a piezoelectric actuator for an injector used as a driving source of an injector.